

Age of the Surface of Venus

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Impact craters on Venus appear to be uniformly and randomly strewn over a once, but no longer, geologically active planet. To first approximation, the planet shows a single surface of a single age. Here we use Monte Carlo cratering simulations, based on the present populations of Near Earth Objects (NEOs) and in which atmospheric shielding is taken fully into account, to show that the nominal age of the surface is 800^{+800}_{-400} Ma. This is 2-3 times older than previous estimates, yet it is consistent with the terrestrial cratering record provided that atmospheric shielding is taken fully into account, and not inconsistent with the lunar record.

Global resurfacing of Earth's oceanic crust occurs on a 100 Ma timescale. The mechanism is the now-familiar plate tectonics. If the apparently uniformly aged venerian surface were truly only 300 Ma old, global resurfacing on Venus would need to have occurred considerably faster, probably over less than 50 Ma, otherwise relative ages would be apparent in the cratering record. For a young Venus one must explain not only the fact of global resurfacing but also its speed. If the surface were 800 Ma old, a 100 Ma resurfacing timescale poses no problem; the mechanism might even have been ordinary plate tectonics, since founded. As global resurfacing recedes deeper into history, the likelihood that Venus is now resting between bouts of activity would seem to diminish. Instead, it appears increasingly likely that Venus, like Mars, is dead.

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